Letters to the Journal

TOXICITY OF DECOMPOSITION PRODUCTS OF "TEFLON"

To the Editor:

In the October 21 issue of the *Canad. M. A. J.* (85: 955, 1961) there was a letter describing the toxicity of thermal decomposition products of "Teflon". This was described as being a rare hazard, but I wonder if this could become a more common danger owing to the recent widespread distribution of a household product, "T-FAL" Teflon-lined frying pans. To my knowledge nothing has been mentioned about any hazard from overheating these pans. If such a hazard as producing the toxic gas, perfluoroisobutene, by scorching one of these pans does exist, then adequate warning should be given to the public, and possibly the product should be withdrawn from the market.

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[The following letters may answer Dr. Houston's query, at least in part.—EDITOR]

To the Editor:

I think that you should check further the "case" described in Dr. G. J. Mack's letter headed "Toxicity of Decomposition Products of Teflon".

I doubt that the B.C. Fire Chiefs' Association *Notes and News* was providing "pukka gen" in this instance.

There is on reliable record very little if any evidence that Teflon is as potentially toxic as your editorial and Dr. Mack's letter state.

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To the Editor:

I am interested in the letter of Dr. G. J. Mack concerning this question (*Canad. M. A. J.*, 85: 955, 1961). In recent months there has been a great deal of speculation and discussion about the toxicity of the decomposition products of fluorocarbon resins. I believe the following points should be noted:

1. Evidence of lung damage from such decomposition products presently exists only in animals under experimental conditions.

2. In humans, cases of the so-called "polymer fume fever" following inhalation of decomposition products of these resins are well established. This condition is a self-limiting one similar in appearance to metal fume fever. There is no evidence that lung damage is produced in this condition.

3. To my knowledge there has been no fatality or case report with lung damage recorded in the medical literature from the inhalation of these thermal decomposition products. There have been, however, repeated references in recent months to an alleged death in a worker in the manner described by Dr. Mack. I have not been able to establish this as anything more than a rumour.

I would greatly appreciate it if Dr. Mack could provide clinical details of the case to which he refers. I would suspect, however, that he has quoted the word-of-mouth story which I have mentioned above.

I do not wish to minimize the potential hazard which may exist from inhalation of fluorocarbon decomposition products. The available evidence, however, indicates that the use of these resins has not resulted in serious trouble. In addition, these resins provide unique uses of great value because of their special properties.

In this case, also, it seems to me that it would have been advisable to check into this question more fully prior to publication of this information, particularly in view of the unfounded rumours being circulated. May I also draw attention to one minor error in the editorial—Dacron is a polyester resin fibre and not polyethylene.

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To the Editor:

I would greatly appreciate the opportunity to inform readers of the *Canadian Medical Association Journal* concerning a practical approach to the evaluation of the hazard incurred by the use of Teflon.

In my position as Technical Services Engineer of the Industrial Accident Prevention Associations, I have been aware of the hazards attributed to Teflon for over three years. Because of the serious results purported, an investigation was necessary.

In assessing a hazard, two considerations are paramount. First, how serious will the accident be, if it occurs? Secondly, what is the degree of likelihood of the accident occurring?

My study indicates two forms of toxicity from Teflon. The more common form, "polymer fume fever", which resembles metal fume fever, is covered by Fairhall on page 254 of his book "Industrial Toxicology". The second form of toxicity is that covered by Dr. Mack's letter and reported by Dr. Zapp of du Pont's Haskell Laboratories in 1955.

With respect to seriousness, the fume fever, although unpleasant, is not serious. The decomposition products would cause a serious situation. With respect to past experience, Fairhall reports cases of fume fever, but no authoritative report exists of the occurrence of the second form of illness.

This is reasonable, as the fume problem has been recognized and fabricators using this material use normal exhaust ventilation to remove the fumes as formed. All authorities are agreed on the need for protection when the material is deliberately heated to the elevated temperatures necessary for extrusion, etc.

However, the mechanism for the hazard from decomposition does not conform to normal plant situations. Considering incineration, Teflon does not burn. Therefore, to be heated to 700° F. or beyond, where decomposition should become a problem, it must be present with considerable amounts of combustible material. These will themselves, in their burning, generate considerable quantities of toxic combustion

products which will be dissipated in the air, along with the decomposition products of Teflon if burned outdoors.

If involved in a fire indoors, fire studies indicate that the area would be uninhabitable because of combustion products before the Teflon would decompose. It is highly improbable that flash fires or minor heat sources, such as cigarettes, would cause this decomposition.

In summary, I feel that the hazards of Teflon are minimal, and for the typical plant where it is present in bearings, etc., hazards are non-existent from the practical point of view. Large-scale users such as fabricators have recommendations available from manufacturers and safety groups such as ours for the safe handling of the material. Again, it should be pointed out that the hazard being covered is that due to the polymer fume since it occurs first, not the hazard of the decomposition products.

Finally, many users such as food processors and electrical manufacturers use large quantities of Teflon without heating. They should understand the hazards and take rational steps to prevent overheating by such processes as welding. This is particularly important where Teflon is used in confined spaces such as linings for tanks.

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To the Editor:

Reference my letter which appeared in the *Canadian Medical Association Journal* of October 21 reporting the official monthly *Notes and News* publication of the British Columbia Fire Chiefs' Association on the subject of Teflon. This release received province-wide distribution to British Columbia fire chiefs as a potential fire hazard and as such was referred to our Industrial Safety Department. Although not infallible, this Association is the logical regional authority on the subject of fire hazards.

Subsequent to the publication of my letter, I have been informed that the British Columbia Fire Chiefs' information was apparently based on material released by the Union Carbide Corporation in the fall of 1960. It was subsequently promulgated by several U.S. Air Force local publications.

The Union Carbide Corporation, upon further investigation, and with the co-operation of du Pont, reported, in December of last year, "There have been no deaths or permanent injuries known to stem from Teflon; *all rumours of death are false.*" (Italics mine.) A similar release was originated from the office of the Inspector General, United States Air Force, in March 1958, and the U.S. Navy *News Letter* of January 1959.

Independently, our Industrial Safety Department corresponded with the National Research Council on this subject. After reviewing 15 research and investigational reports which failed to verify any reports of serious complications resulting from its use, they recommended that "Teflon requires the same order of safe handling techniques and methods as practically any other organic material that forms thermal decomposition gases when subjected to high temperatures." Specifically they quote The Food and Drug Administration safety endorsement for its use in cooking utensils.

Of significance, only in retrospect and in no way altering the content of my original letter, was a minor editorial change. My original letter included all the material from para. 2 to para. 4 inclusive in quotation marks, which included the fictitious fatality. The quotation marks were omitted in the published version and led to the erroneous interpretation by Dr. Mastromatteo that I was quoting a hearsay incident as personal experience.

One can only sympathize with either individuals or companies who are erroneously misrepresented in credible print. Subsequent denials and retractions unfortunately never completely erase the original damage. I sincerely regret my role in perpetuating this unfounded rumour regarding Teflon.

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PROLONGED RETENTION OF THE DEAD FETUS

To the Editor:

I have had my attention drawn to a rather clumsy and misleading apposition of two sentences in my paper entitled "Prolonged Retention of the Dead Fetus", published in the *Canada. M. A. J.* (85: 932, 1961). I refer to page 936.

"(e) A Syntocinon induction is started. The infusion is maintained for eight hours and repeated daily for three days with increasing dosage until active contractions occur. This infusion must at all times be under careful control of the medical attendant. When labour ensues and the cervix is two to three fingers dilated, the membranes are ruptured. If labour does not begin with this routine, the patient is discharged for one week."

This might be construed that the patient is sent home for one week even with ruptured membranes. It should be stressed that the membranes are not to be ruptured unless the patient is in productive labour with the cervix dilated at least three fingers. Following this, the fetus is delivered quickly. Under no circumstance is the patient sent home after amniotomy. The patient is only discharged if labour does not supervene even after repeated and adequate infusion of Syntocinon.

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PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

The correct diagnosis of uterine fibroids, while usually easy, is sometimes most difficult, and the history of the subject is fraught with mistakes. I have more than once opened the abdomen for operation to remove a uterine fibroid to find that I had to deal with the much simpler condition of intra-ligamentous cyst. — William Gardner: Address in Gynæcology, *Canad. M. A. J.*, 1: 1133, 1911.